



W E L C O M E

**RITA** Intelligent Transportation Systems  
Joint Program Office

# Welcome



- Shelley Row, P.E., PTOE
- Director
- ITS Joint Program Office
- [Shelley.Row@dot.gov](mailto:Shelley.Row@dot.gov)

## WWW.PCB.ITS.DOT.GOV



The screenshot shows the homepage of the RITA Intelligent Transportation Systems Professional Capacity Building Program. The header features the RITA logo and the text "RESEARCH AND INNOVATIVE TECHNOLOGY ADMINISTRATION" and "INTELLIGENT TRANSPORTATION SYSTEMS". Below the header is a navigation menu with links: About RITA, Communities of Interest, Contact Us, Press Room, RITA Offices, Site Map, and a search bar. A secondary menu includes About Us, T3 Webinars, ITS Peer-to-Peer, Resources, Local ITS PCB, and Testimonials. The main content area is titled "ITS Professional Capacity Building Program" and includes a welcome message, technical assistance information, and a list of scheduled T3 webinars. The "News" section lists recent updates and events.

**ITS Professional Capacity Building Program**

Updated June 3, 2011

**Welcome to ITS Professional Capacity Building**

The ITS Professional Capacity Building (PCB) Program provides comprehensive, accessible, and flexible ITS learning for the transportation industry. By using the program, public agencies can build and sustain a capable and technically proficient ITS workforce, and transportation professionals can develop their knowledge, skills, and abilities while furthering their career paths.

The plan, [ITS Professional Capacity Building: Setting Strategic Direction 2010-2014](#), describes the strategy the ITS PCB Program is pursuing to create a 21st century learning environment and build an ITS profession that leads the world in the innovative use of ITS technologies.

**ITS Technical Assistance**

The ITS PCB Program offers technical assistance resources to State and local transportation agencies, and to FHWA Field Offices.

- [ITS Peer-to-Peer Program](#) helps resolve ITS challenges by speaking to your peers.
- The ITS Help Line provides [technical support by e-mail](#) or telephone 866-367-7487.

**Scheduled T3 Webinars**

Register now for these upcoming T3 webinars:

**June 23, 2011 1:00 PM – 2:30 PM ET**  
[2011 Enhancements to the ITS Knowledge Resources Websites: Improving Access to Information on ITS Benefits, Costs, Lessons Learned and Deployment](#)

**June 29, 2011 1:00 PM – 2:30 PM ET**  
[Open Payments, Mobile Payments and Personal Identification Verification \(PIV\) Acceptance – Overview of Innovations in Public Transit Payment Systems](#)

[View T3 webinar archives.](#)

**News**

- Act Now! [Fee Waived for June CITE Blended Course](#)
- NTI Offering: [Implementing Rural Transit Technology](#)
- T3 Webinar playback and archives now available for 1/18/2011 webinar: ["The Emergence of Open Electronic Payment Systems in Public Transit"](#)
- New NTI Course: [Implementing Contactless Fare Collection Systems](#)
- T3 Webinar Archive Now Available: [Open Source Alternative to Deploying Transportation Management Systems](#)
- T3 Webinar Archive Now Available: [TSAG Case Studies Workshop and Webinar- NG9-1-1 What's Next Forum & Webinar](#)
- Two new CITE offerings: [Road Weather Information Systems \(RWIS\) Equipment and Operations](#) and [Configuration Management for Traffic Management Systems](#)
- Added to the T3 Archives: [8/3/10 Webinar: TSAG Case Studies Workshop and Webinar — 2009 Fort Hood, Texas Army Base Shooting Incident: A Multi-Agency](#)



**RITA**

U.S. Department of Transportation  
Research and Innovative Technology Administration

STANDARDS  
**ITS**  
TRAINING

# **I101: Using ITS Standards An Overview**



# Course Information

- Prerequisites: None
- Target Audience:
  - Public sector managers
  - Decision makers



# Instructor



**Gary B. Thomas, P.E., Ph.D.**

Center Director

Texas Transportation Institute

College Station, TX, USA

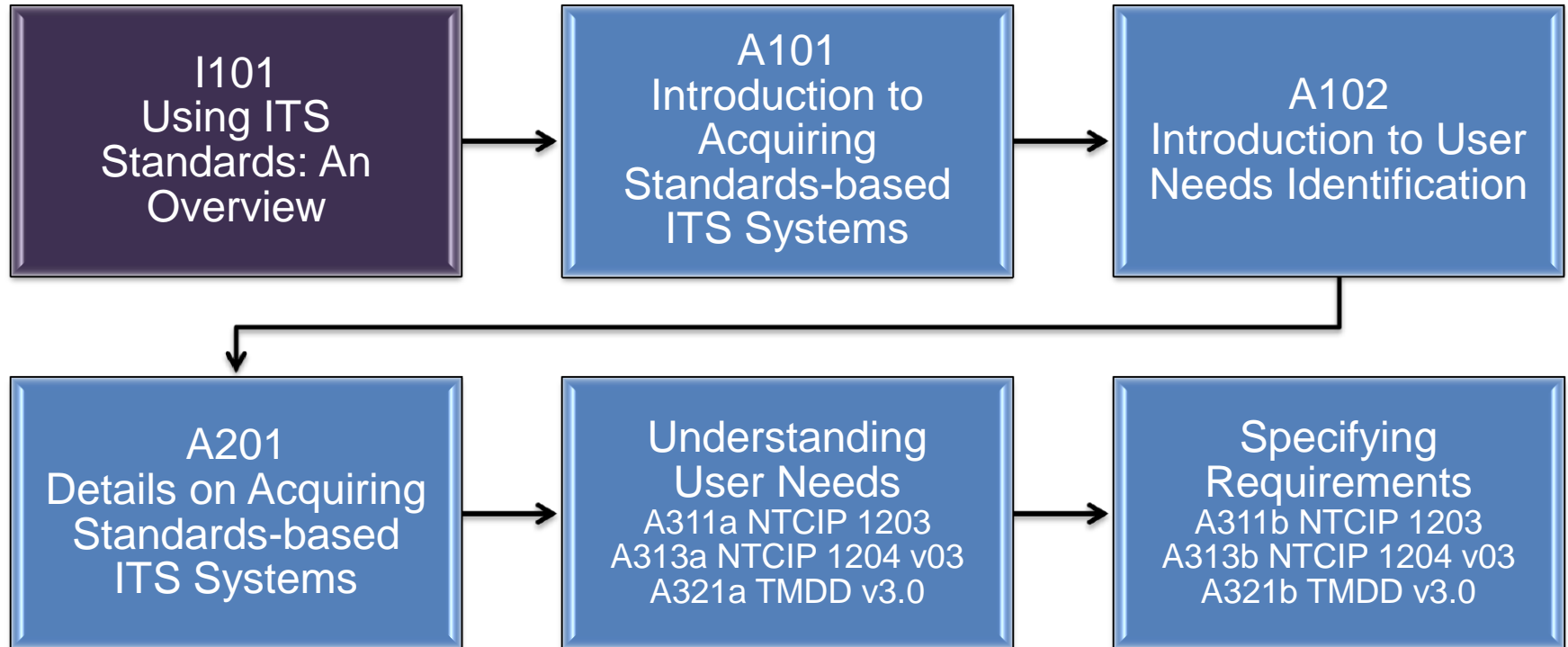


**RITA**

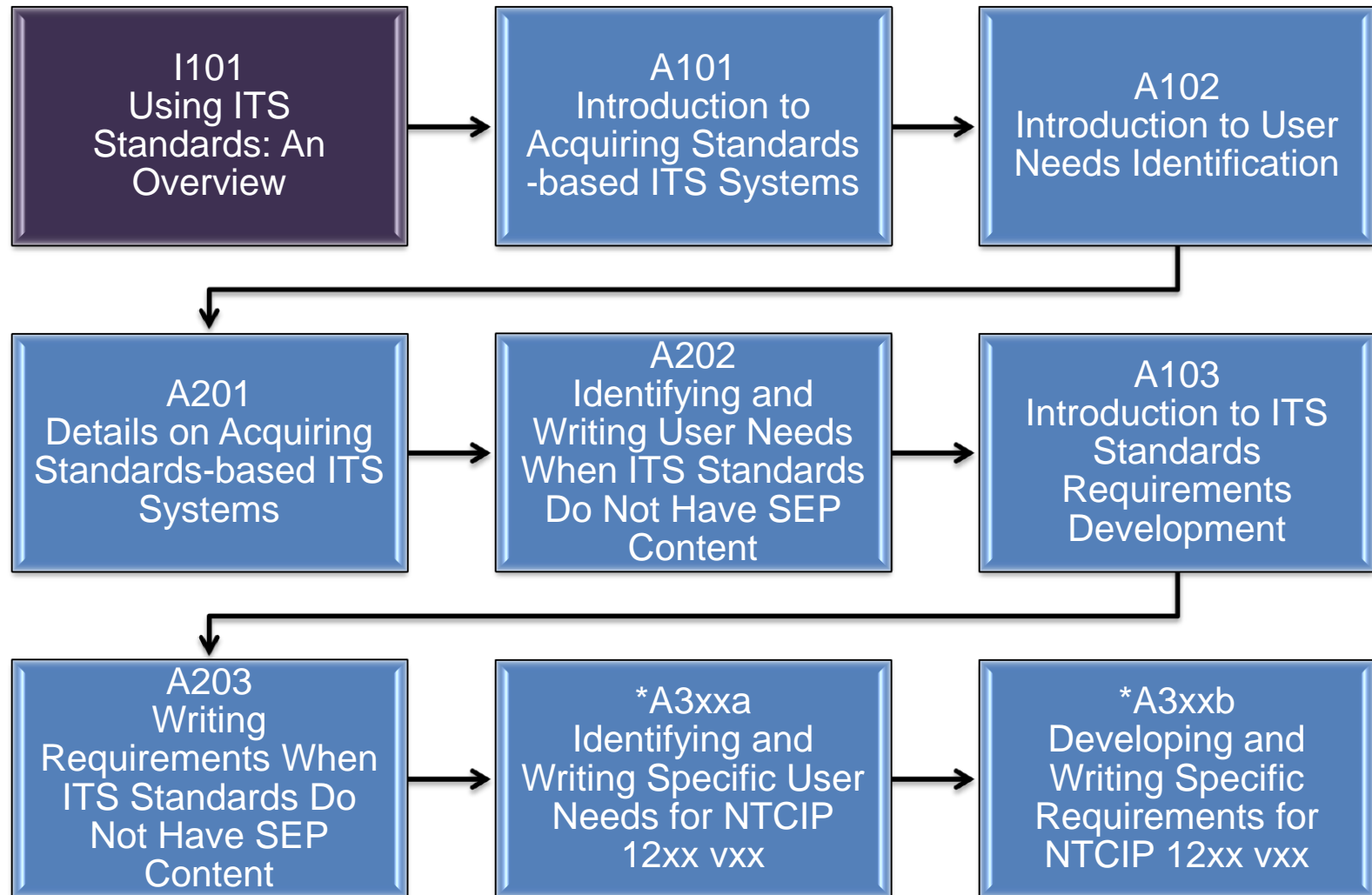
U.S. Department of Transportation  
Research and Innovative Technology Administration



# Curriculum Path (SEP)



# Curriculum Path (Non-SEP)



# Learning Objectives

1. Identify the benefits and costs of using standards in ITS projects
2. Describe the benefits of using the systems engineering process in ITS projects
3. Identify and address high-level technical and institutional challenges to using standards
4. Describe the role of ITS standards in ITS applications



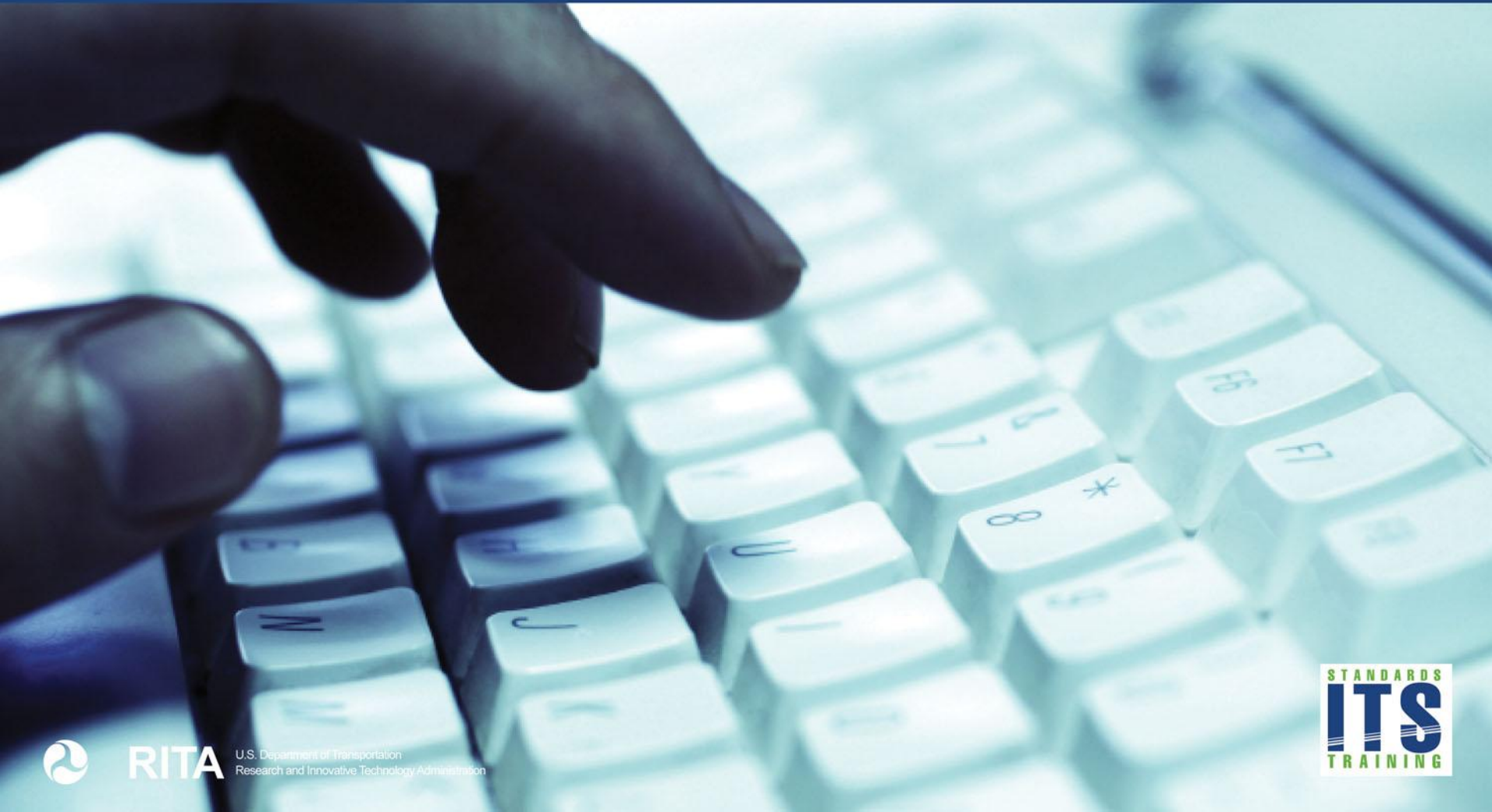


# What Are Standards?

- Established norm or requirement about technical systems that establishes:
  - Uniform engineering or
  - Technical criteria, methods, processes, and practices
- Most standards are:
  - Voluntary
  - Consensus based
  - Open



# ACTIVITY



**RITA**

U.S. Department of Transportation  
Research and Innovative Technology Administration



# Benefits of Using Standards

- What do you see as possible benefits of using standards?
- Use the chat pod to answer



# What Are ITS Standards?

- Define how ITS systems, products, and components:
  - Interconnect...
  - Exchange information...
  - Interact...
  - Within a transportation network
- They are not design standards



# Benefits

- Supports interoperability
- Supports 940 compliance
- Minimizes future integration costs
- Facilitates regional integration
- Supports incremental measurable development
- Prevents technological obstacles
- Minimizes operations and maintenance costs
- Prepares for emerging technologies
- Makes procurements easier
- Makes testing easier



# Benefits

## Supports interoperability

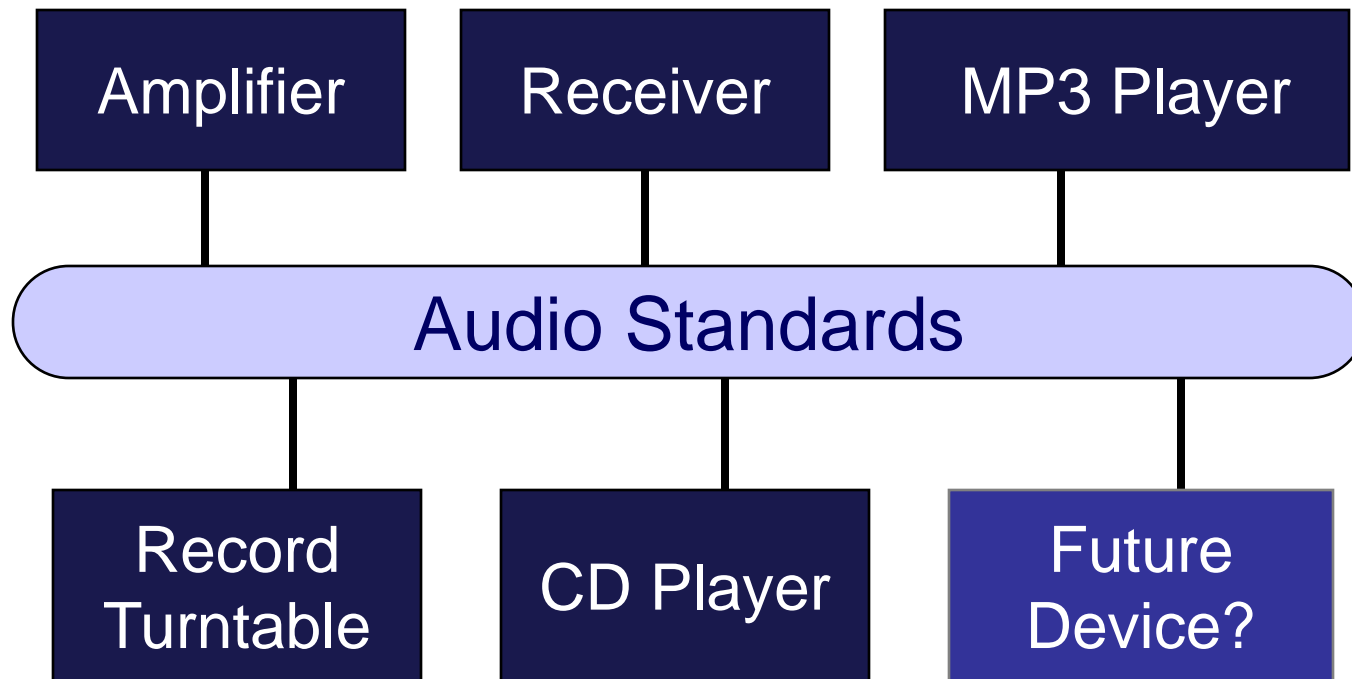
- The ability of an ITS system to:
  - Provide information and services to other systems
  - Use exchanged information and services to operate together effectively
- Analogy: home theater system



Source: Gary B. Thomas

# Benefits

## Supports interoperability



# Benefits

## Supports Rule 940 Compliance

- FHWA rule enacted on January 8, 2001
- Requires a systems engineering analysis for ITS projects using highway trust funds
- Seven requirements included in the SE analysis (see supplemental materials)
  - #6 states: Identification of applicable ITS standards and testing procedures



# Benefits

## Minimizes Future Integration Costs

- Not locked into proprietary systems
- Expansion is easier
- Still allows for innovation



# Benefits

## Facilitates Regional Integration

- Makes it easier to communicate with other jurisdictions
- Reduces miscommunication
- Improves coordination of field devices

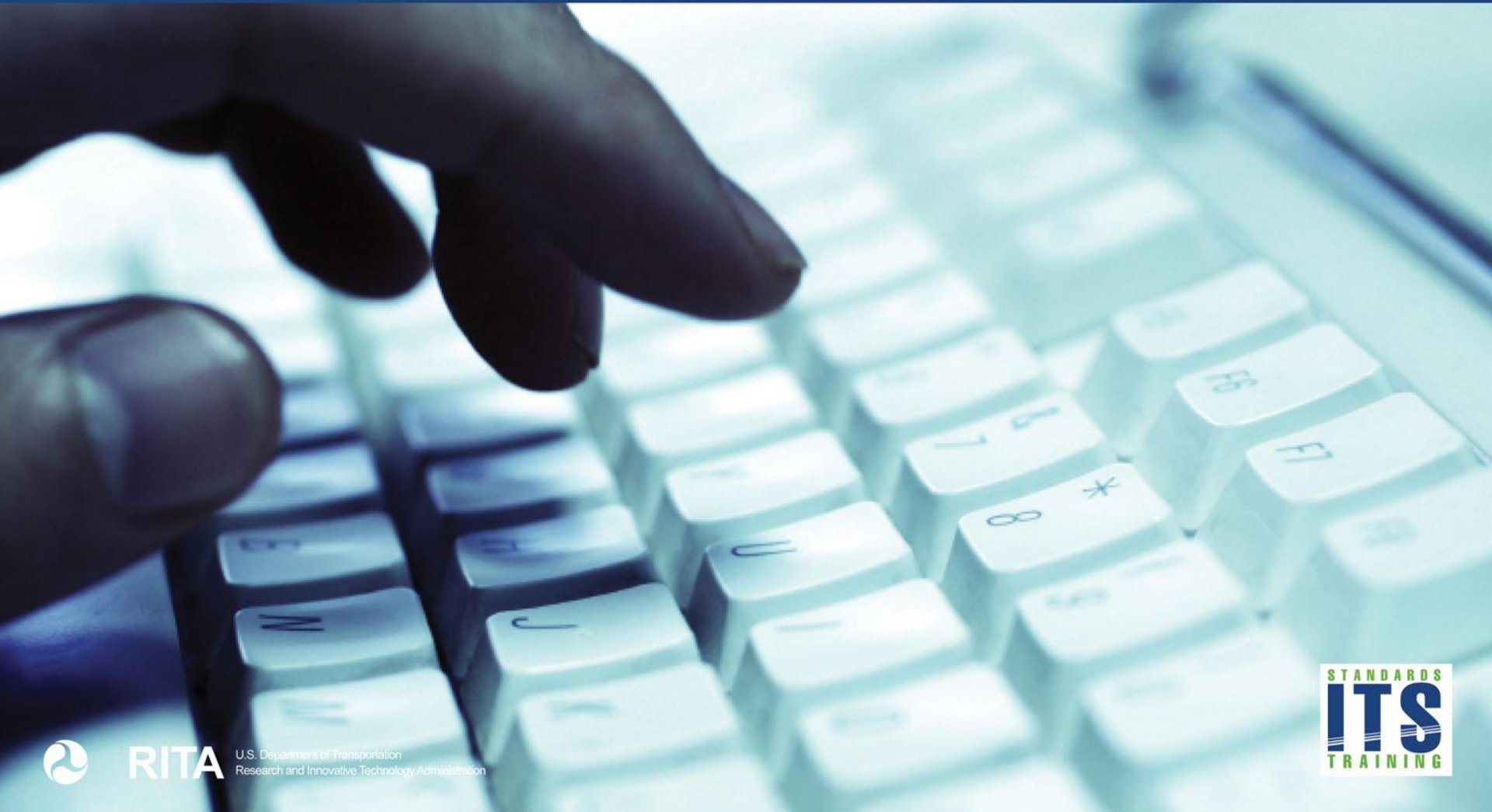


# Benefits

## Others

- Supports incremental measurable development
- Prevents technological obstacles
- Minimizes operations and maintenance costs
- Prepares for emerging technologies
- Makes procurements easier
- Makes testing easier
- Minimizes risk

# ACTIVITY



**RITA**

U.S. Department of Transportation  
Research and Innovative Technology Administration



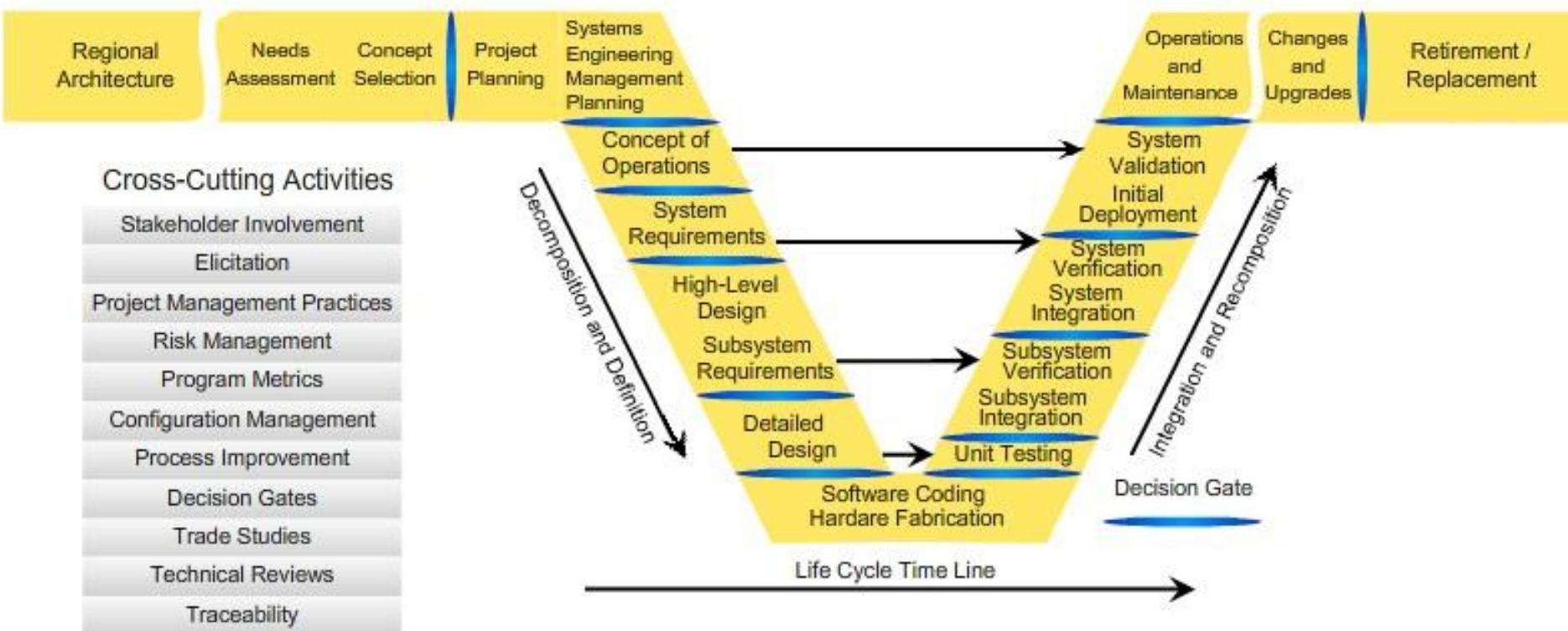
# Costs of Using ITS Standards

- What do you think are potential COSTS of implementing a standards-based system?
- Use the chat pod to answer



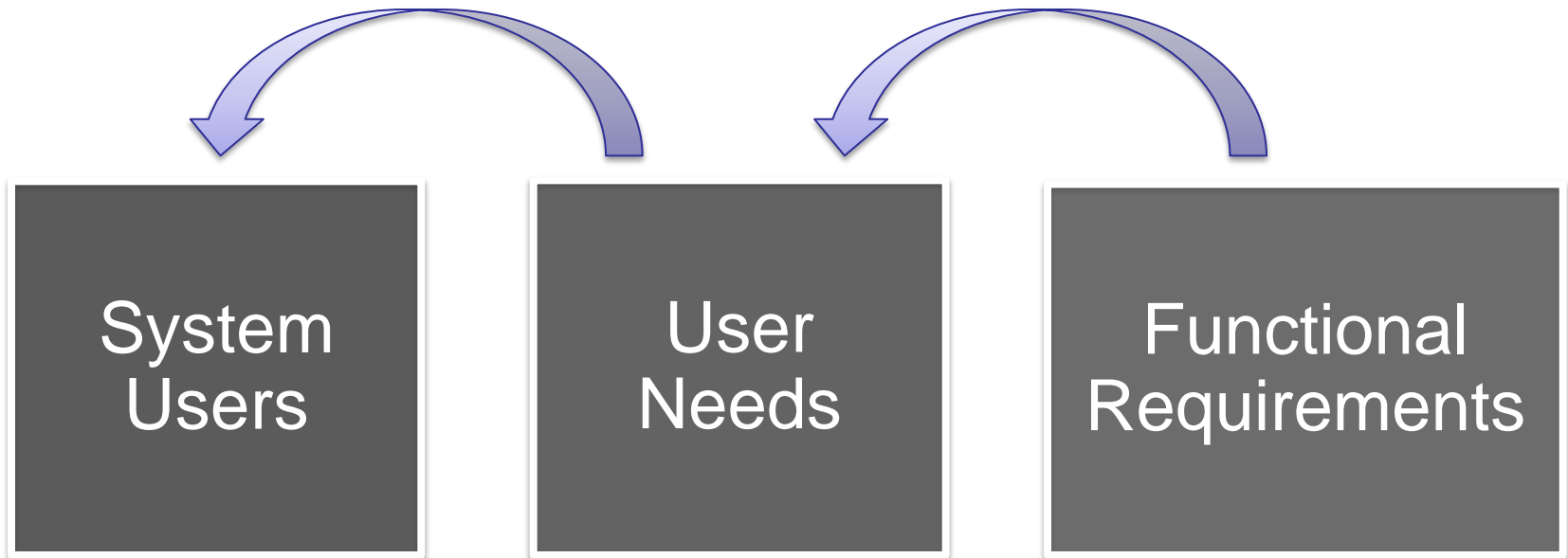
# Systems Engineering Process (SEP)

Phase -1	Phase 0	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Interfacing with Planning and the Regional Architecture	Concept Exploration and Benefits Analysis	Project Planning and Concept of Operations Development	System Definition and Design	System Development and Implementation	Validation, Operations and Maintenance, Changes & Upgrades	System Retirement / Replacement



# Needs, Requirements, and Traceability

- Focus on the WHAT – not the HOW
- Every need has at least one requirement
- Every requirement should trace to at least one need



# Benefits of Using SEP

- Provides framework and process to verify that the system meets user needs
- Improved stakeholder participation
- More adaptable, resilient systems
- Verified functionality and fewer defects
- Higher level of reuse from one project to the next
- Better documentation

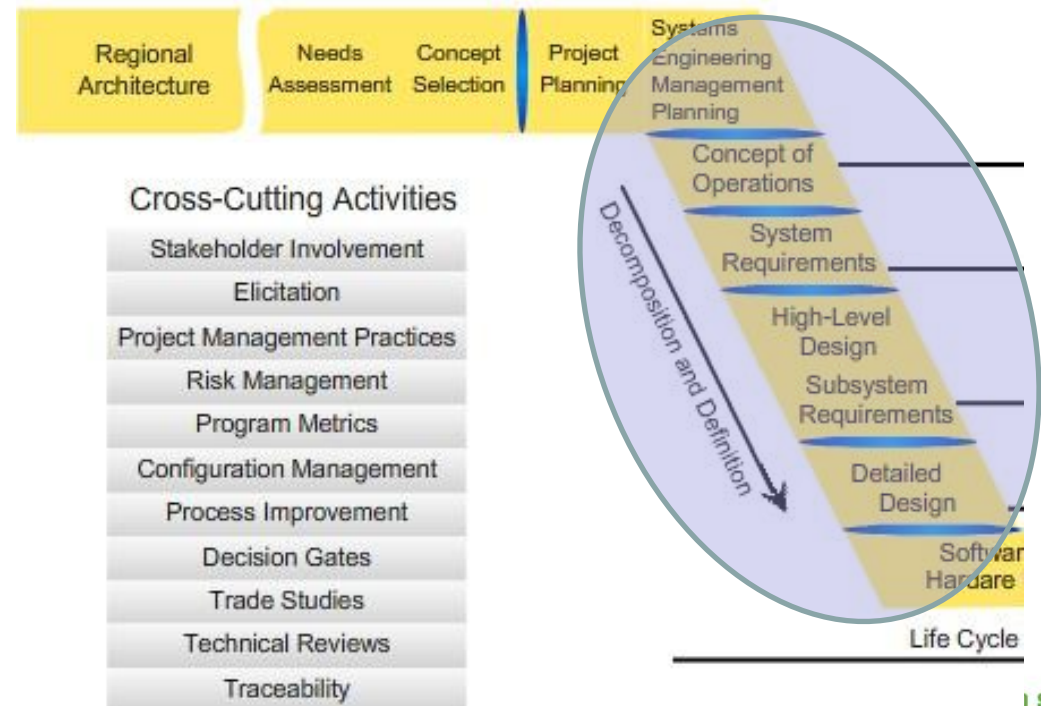




# How Do Standards Relate to SEP?

- Primarily used in the design stage of SEP
- After the concept of operations and initial project planning has been developed

Phase -1	Phase 0	Phase 1	Phase 2
Interfacing with Planning and the Regional Architecture	Concept Exploration and Benefits Analysis	Project Planning and Concept of Operations Development	System Definition and Design

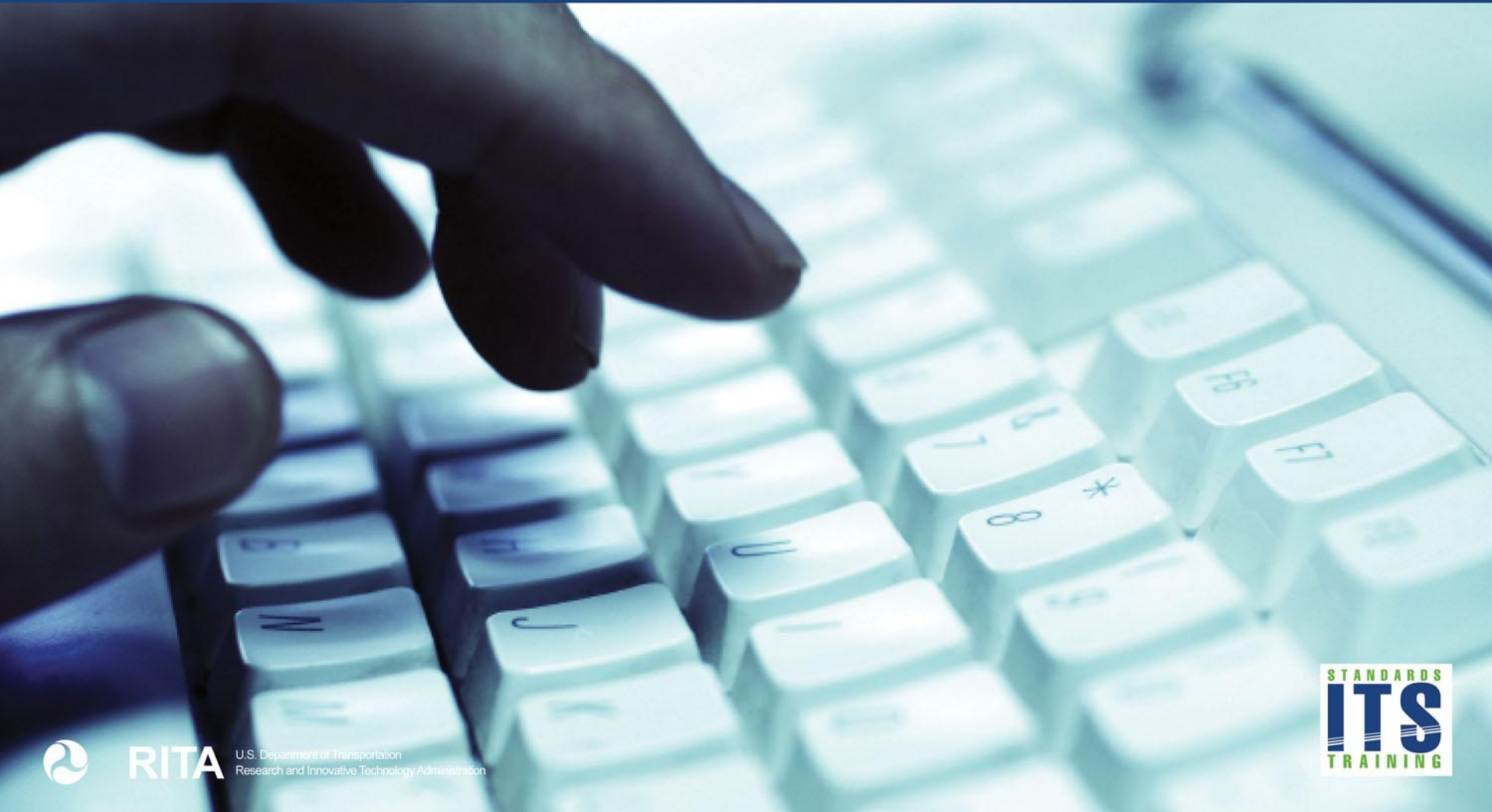


# SEP-based Standards

- Early ITS standards were not developed using SEP
- Some have been redeveloped using SEP
- SEP-based standards include user needs, requirements, needs to requirements and requirements to design matrices and design solutions
- SEP-based standards better ensure that systems will be conformant to ITS standards



# ACTIVITY



**RITA**

U.S. Department of Transportation  
Research and Innovative Technology Administration



# Technical and Institutional Challenges

- What do you think some of the most common **technical** challenges are?
- Use chat pod to answer
- What do you think some of the most common **institutional** challenges are?
- Use chat pod to answer



# Technical and Institutional Challenges

## Technical

Gaps in existing skills

Inconsistent industry support for standards

Conformance to standards

Paradigm shift from non-standards based to standards based

Paradigm shift from non-SE based to SE-based

## Institutional

Not everyone in an agency is willing to articulate their needs

Resistance to change

Not all agencies have bought into regional integration

Paradigm shift from non-standards based to standards based

Paradigm shift from non-SE based to SE-based





# CASE STUDY



**RITA**

U.S. Department of Transportation  
Research and Innovative Technology Administration



# Lessons From the Field

## Functional Integration

- Develop usable systems that meet user needs, assess user needs, and follow accepted usability engineering practices when developing interactive systems
- Use ITS standards when developing systems to maximize vendor flexibility and data exchange compatibility and ensure comprehension by agencies



# Lessons From the Field

## Jurisdictional Integration

- Create systems and plans that allow information sharing and coordination among regional agencies and states
- Consider developing an emergency response plan that coordinates command, control, and communications among regional agencies





# Lessons From the Field

## Legacy Systems

- Comply with standards and select proven commercial off-the-shelf technology (hardware and software) when possible to save money and facilitate integration with existing legacy systems
- To identify and resolve system integration issues with existing legacy equipment, plan on adequate development time and thorough system testing to ensure systems are working properly after system integration

# Lessons From the Field

## Functional integration

- TriMet (Oregon)
- Traffic Management Center (TMC) study

## Jurisdictional integration

- Washington, DC metro area
- Iowa DOT

## Legacy systems

- TriMet

# Lessons From the Field

## Functional Integration

### TriMet's LED signs

- No TCP/IP standards existed for LED sign interface
- TriMet provided specs that required vendors to interface with protocols
- Such compliance ensured a modular and compatible infrastructure
- Benefits: Supports interoperability, facilitates regional integration, minimizes operations and maintenance costs

# Lessons From the Field

## Functional Integration

### TMC Study

- 10 states
- Use of standards allows better coordination of TMC efforts
- Increased efficiency of traffic and emergency operations
- Incomplete/inaccessible information is an impediment
- Benefits: Facilitates regional integration



# Lessons From the Field

## Jurisdictional Integration

### Washington. DC metro area

- September 11 revealed negative consequences of a lack of coordination
- No communication between different DOTs or between DOTs and transit agencies
- Emergency evacuation strategies hampered
- Benefits: Facilitates regional integration, supports interoperability



# Lessons From the Field

## Jurisdictional Integration

### Iowa DOT

- Statewide ITS architecture emphasized interoperability between transit agencies
- Template developed for ITS contracts
- Transit agencies must agree to terms in contract template
- Benefits: Supports interoperability, makes procurements easier



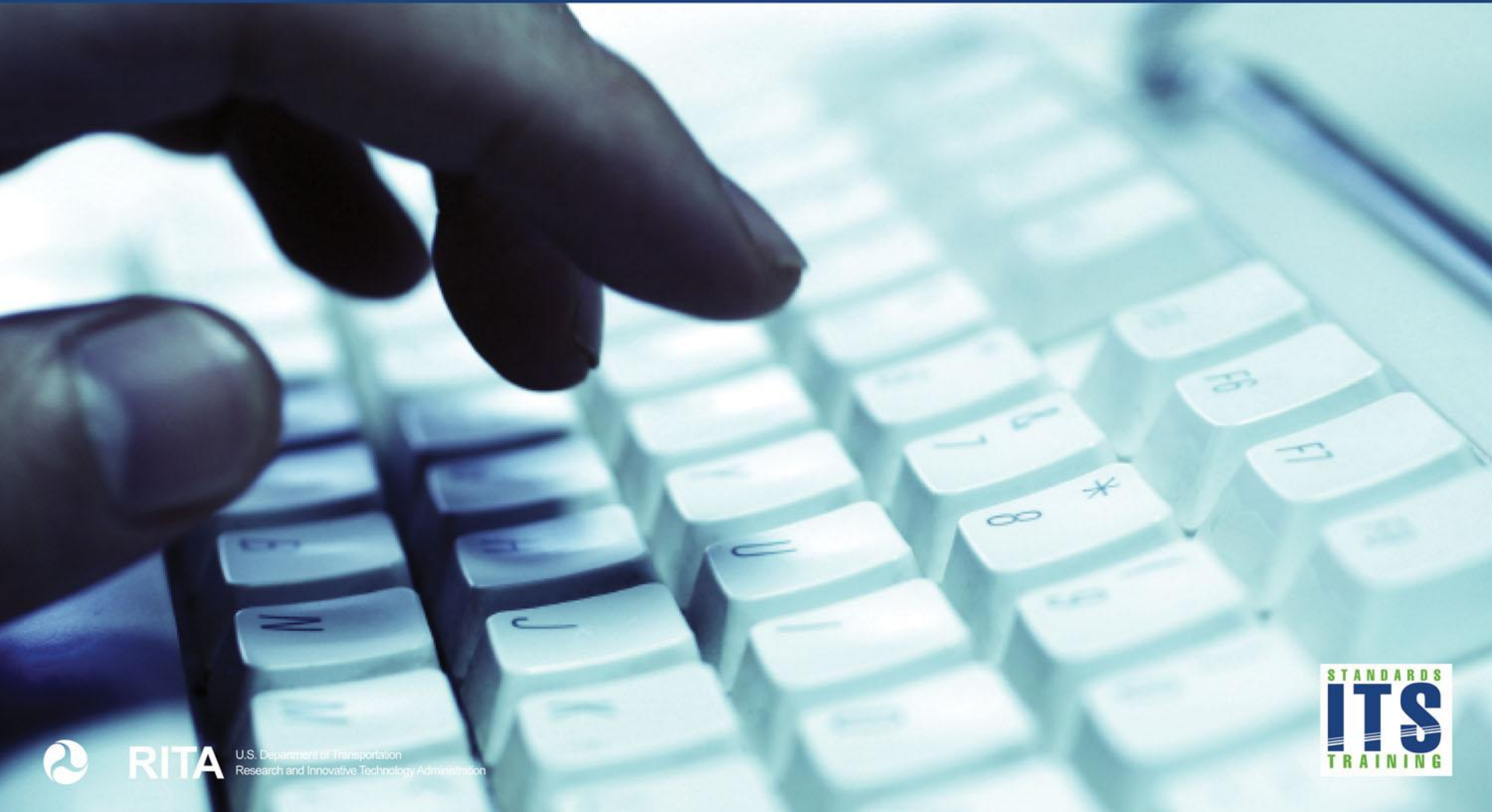
# Lessons From the Field

## Legacy Systems

### TriMet's TransitTracker

- Built upon an existing bus dispatch system and rail central control system
- Same platform for existing and proposed systems
- Saved software development time and costs
- Benefits: Minimizes future integration costs, makes procurements easier

# ACTIVITY



**RITA**

U.S. Department of Transportation  
Research and Innovative Technology Administration





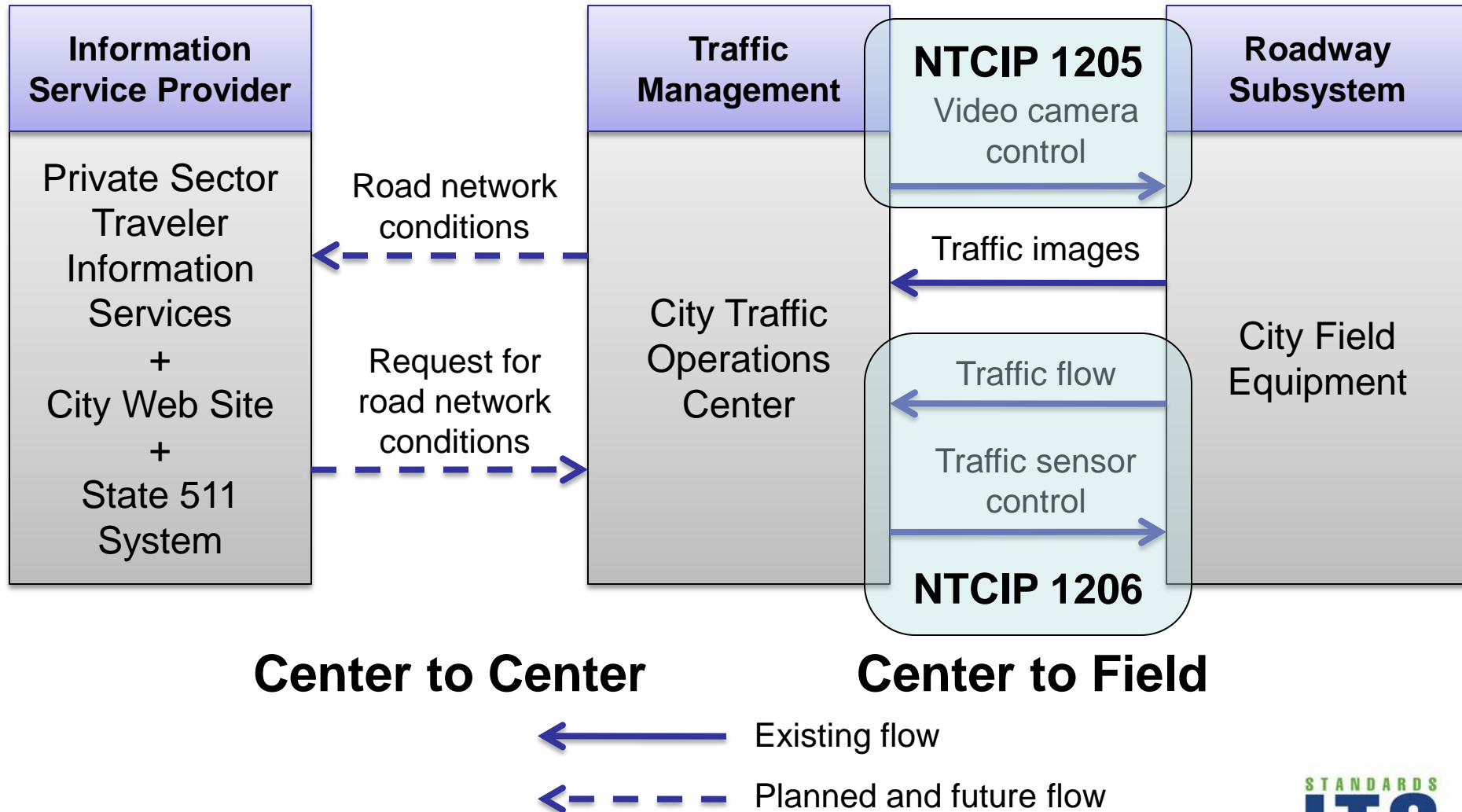
# Lessons From the Field

## Participant Experiences

- What lessons have you learned from your own projects?
- Answer in chat pod



# Role of ITS Standards in ITS Applications



# Review of Learning Objectives

1. Identify the benefits and costs of using standards in ITS projects
2. Describe the benefits of using the systems engineering process in ITS projects
3. Identify and address high-level technical and institutional challenges to using standards
4. Describe the role of ITS standards in ITS applications



# Student Supplement



- ITS Standards FAQ
- General ITS standards reference information
- ITS Architecture and Standards Final Rule (01/08/01)

# QUESTIONS?



**RITA**

U.S. Department of Transportation  
Research and Innovative Technology Administration



# For More Information

RITA/ITS Web site

<http://standards.its.dot.gov/>

ITE Web site

<http://www.ite.org/standards/>

ITS Architecture Implementation Program

[http://www.ops.fhwa.dot.gov/its\\_arch\\_imp/](http://www.ops.fhwa.dot.gov/its_arch_imp/)

NTCIP Web site

<http://www.ntcip.org/>

Systems Engineering Guide for ITS

<http://www.fhwa.dot.gov/cadiv/segb>



# Next Course

## A101: Introduction to Acquiring Standards-Based ITS Systems

The module provides key reference points and information for participants to be able to communicate procurement strategies for standards-compliant systems.

